

WHAT IS CLAIMED IS:

- 1 1. A magnetoresistive head comprising:
2 an antiferromagnetic film;
3 a pinned magnetic layer which is formed in contact with the antiferromagnetic
4 film, the magnetizing direction of the magnetic layer being pinned by an exchange coupling field
5 with the antiferromagnetic film;
6 a non-magnetic conductive film in contact with the pinned magnetic layer; and
7 a free magnetic layer in contact with the non-magnetic conductive film;
8 wherein the free magnetic layer has first and second free magnetic films
9 sandwiching a non-magnetic intermediate film therebetween, the respective magnetizing
10 directions of the first and the second free magnetic films are in antiparallelism, the length of the
11 free magnetic layer in the direction of the track width is 200 nm or less, and a difference between
12 a product of saturation magnetic flux density and a film thickness of the first free magnetic film
13 and that of the second free magnetic film is within a range from 1 to 3 nmT.

- 1 2. A magnetoresistive head comprising:
2 an antiferromagnetic film;
3 a pinned magnetic layer which is formed in contact with the antiferromagnetic
4 film, the magnetizing direction of the magnetic layer being pinned by an exchange coupling field
5 with the antiferromagnetic film;
6 a non-magnetic insulative film in contact with the pinned magnetic layer; and
7 a free magnetic layer in contact with the non-magnetic insulative film;
8 wherein the free magnetic layer has first and second free magnetic films
9 sandwiching a non-magnetic intermediate film therebetween, the respective magnetizing
10 directions of the first and the second free magnetic films are in antiparallelism, the length of the
11 free magnetic layer in the direction of the track width is 200 nm or less, and a difference between
12 a product of saturation magnetic flux density and a film thickness of the first free magnetic film
13 and that of the second free magnetic film is within a range from 1 to 3 nmT.

- 1 3. A magnetoresistive head comprising:
2 an antiferromagnetic film;

3 a pinned magnetic layer which is formed in contact with the antiferromagnetic
4 film, the magnetizing direction of the magnetic layer being pinned by an exchange coupling field
5 with the antiferromagnetic film;

6 a conductive film in contact with the pinned magnetic layer; and

7 a free magnetic layer in contact with the conductive film;

8 wherein the free magnetic layer has first and second free magnetic films
9 sandwiching a non-magnetic intermediate film therebetween, the respective magnetizing
10 directions of the first and the second free magnetic films are in antiparallelism, the length of the
11 free magnetic layer in the direction of the track width is 200 nm or less, and a difference between
12 a product of saturation magnetic flux density and a film thickness of the first free magnetic film
13 and that of the second free magnetic film is within a range from 1 to 3 nmT.

1 4. A magnetoresistive magnetic head according to any one of claims 1 to 3,
2 wherein a magnetic domain control film is present on a lateral side of the free magnetic layer.

1 5. A magnetoresistive magnetic head according to any one of claims 1 to 3,
2 wherein the pinned magnetic layer has first and second pinned magnetic films sandwiching a
3 non-magnetic intermediate film therebetween, and the respective magnetizing directions of the
4 first and the second pinned magnetic film are in antiparallelism.

1 6. A magnetoresistive magnetic head according to claim 4, wherein the pinned
2 magnetic layer has first and second pinned magnetic films sandwiching a non-magnetic
3 intermediate film therebetween, and the respective magnetizing directions of the first and the
4 second pinned magnetic film are in antiparallelism.

1 7. A magnetic recording unit using the magnetoresistive head according to any
2 one of claims 1 to 3.

1 8. A magnetic recording unit using the magnetoresistive head according to
2 claim 4.

1 9. A magnetic recording unit using the magnetoresistive head according to
2 claim 5.